

ROUGH GUIDES

Thinning Data in LSS

LSSTM

Introduction

With ever expanding datasets coming from laser scanners, LIDAR, RADAR etc, the density of points is increasing and before long it is possible to exceed the 4,080,000 point limit in LSS. So, to overcome this issue we have introduced a data thinning option in the 'Input Load' command. This guide describes how you can use this to produce smaller models which still retain a high degree of precision.

Why is there a point limit in LSS?

If you want to import large amounts of data into LSS you will need to think about how the 4,080,000 observation limit will need to be handled.

There is a 4,080,000 observation per single model limit in LSS in order to make the system efficient and to allow realtime terrain modelling to work. If it had an unlimited model size capability there would be a corresponding increase in the amount of time it would take to perform even the simplest of operations such as editing an observation, drawing a section etc. By setting a maximum database size the system is as efficient with 4 million points loaded than it is with only a few points. The same is unlikely to hold for systems which claim to handle unlimited amounts of data. Or rather, they may not be true modelling systems and as such don't handle dynamic triangulation surfaces.

Importing large data files

Quite often it is necessary to import large datasets such as those generated using LIDAR or Hydrographic sonar equipment. As both of these systems are remotely sensing the terrain surface, they make up for their lack of knowledge of the terrain by covering it with a dense grid of points. It's a bit like surveying in the dark. If you can't see what it is you are measuring you need to cover the whole environment with sample points just so you don't miss anything. If you could see what you were measuring you could sample just what you need.

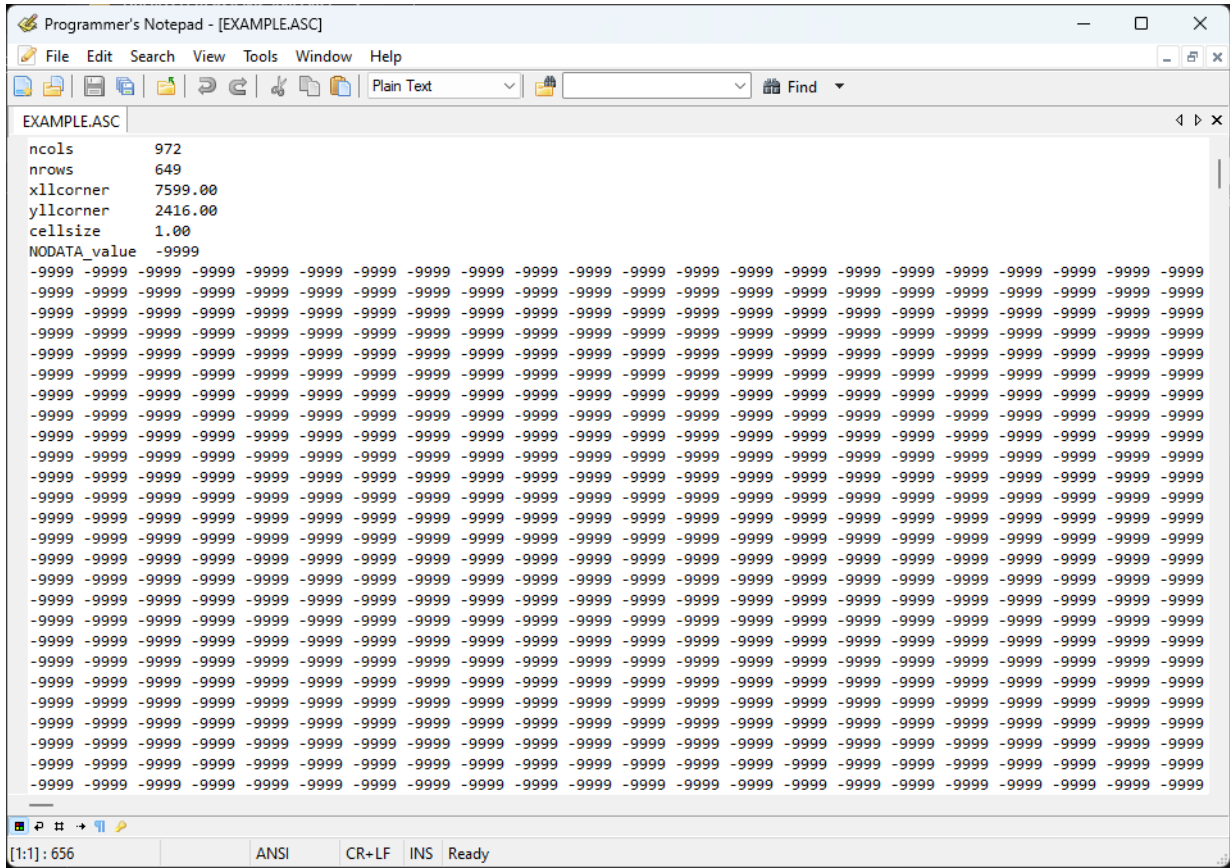
So, you are presented with a grid of data which totals several million points. The aim is to reduce this grid to less than 4,080,000 but not in a way some systems would do it. Some systems just take out every other point and reduce the data that way. This method is crude and there is no way of knowing whether the points that have been removed were important or not.

LSS does this in a completely different way. It is able to 'thin' the data but will only remove those points which will not dilute the quality of the resultant terrain surface.

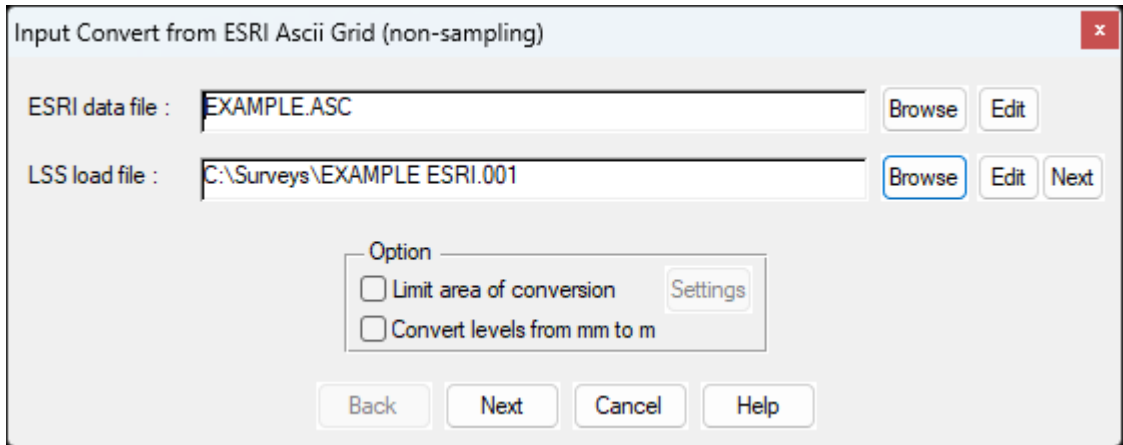
What follows is a description of how to 'thin' two types of data.

LIDAR data in ESRI ASCII Grid format.

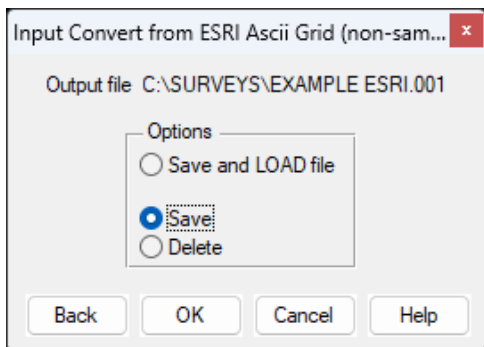
This is what ESRI ASCII Grid data looks like...



The data a whole load of elevations in a grid. The first few lines of the data file tell us the coordinates of the origin of the grid and the grid interval.

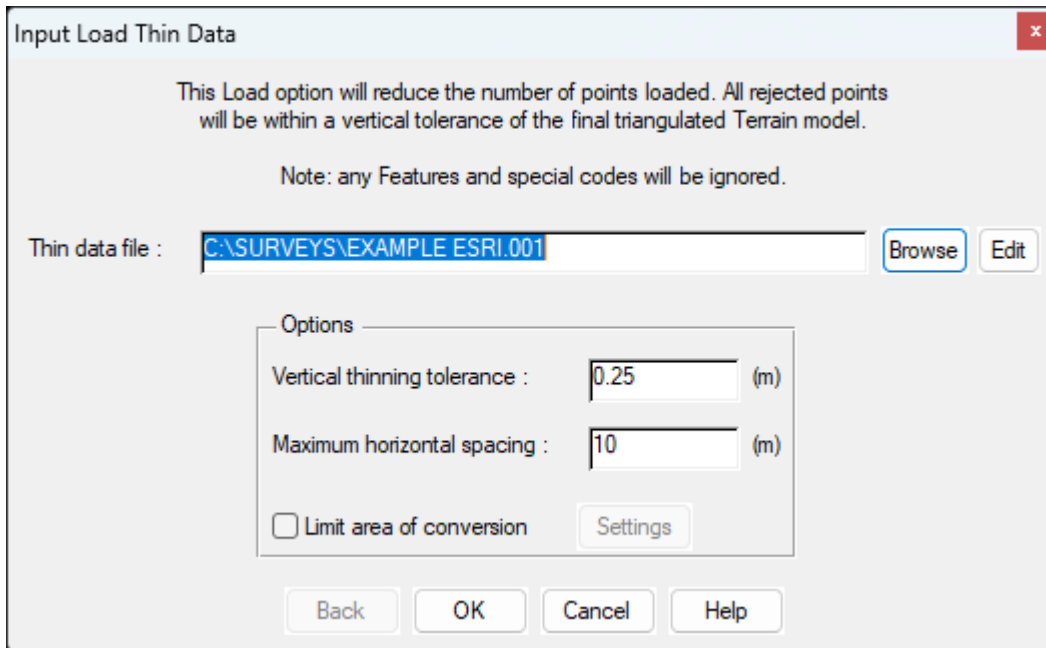


At the end of the conversion the following window appears...



For this example, we will just Save the file.

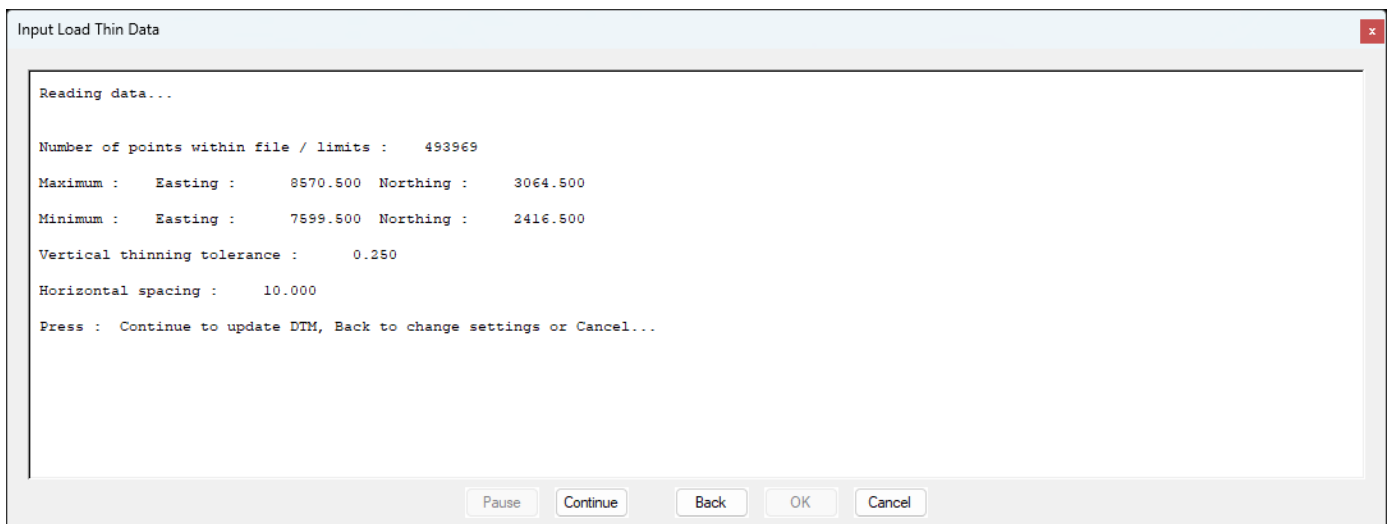
Now we chose the command “Input / Load Thin Data”



You will be asked what thinning tolerances you would be happy to accept.

The vertical tolerance is the guaranteed maximum level difference between the thinned and unthinned model at any location in the resultant model. The maximum horizontal spacing is the maximum distance between observations which are left after thinning. The default value is usually okay. LSS WILL NOT TAKE OUT ANY POINTS WHICH WOULD RESULT IN THE MODEL BEING MORE THAN THE VERTICAL TOLERANCE AWAY FROM AN UNTHINNED MODEL.

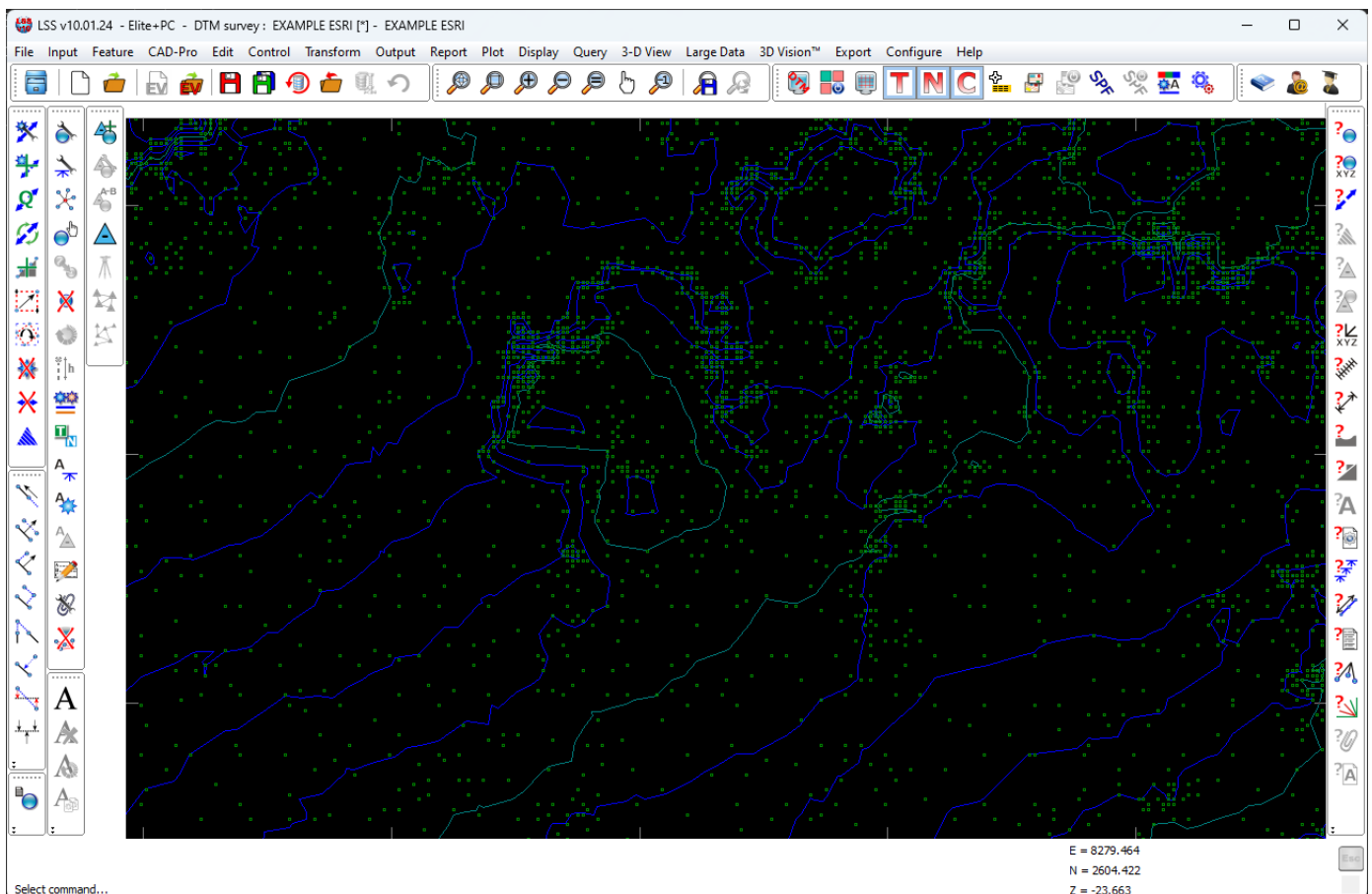
The data example here has 493,969 points to start with.



Even with such a fine vertical tolerance – in this case of only 1cm, the thinning has reduced the points down to 25,498. Bear in mind that this particular dataset only had an accuracy at best of +/- 5cm anyway, so allowing a further +/- 1cm isn't a problem.



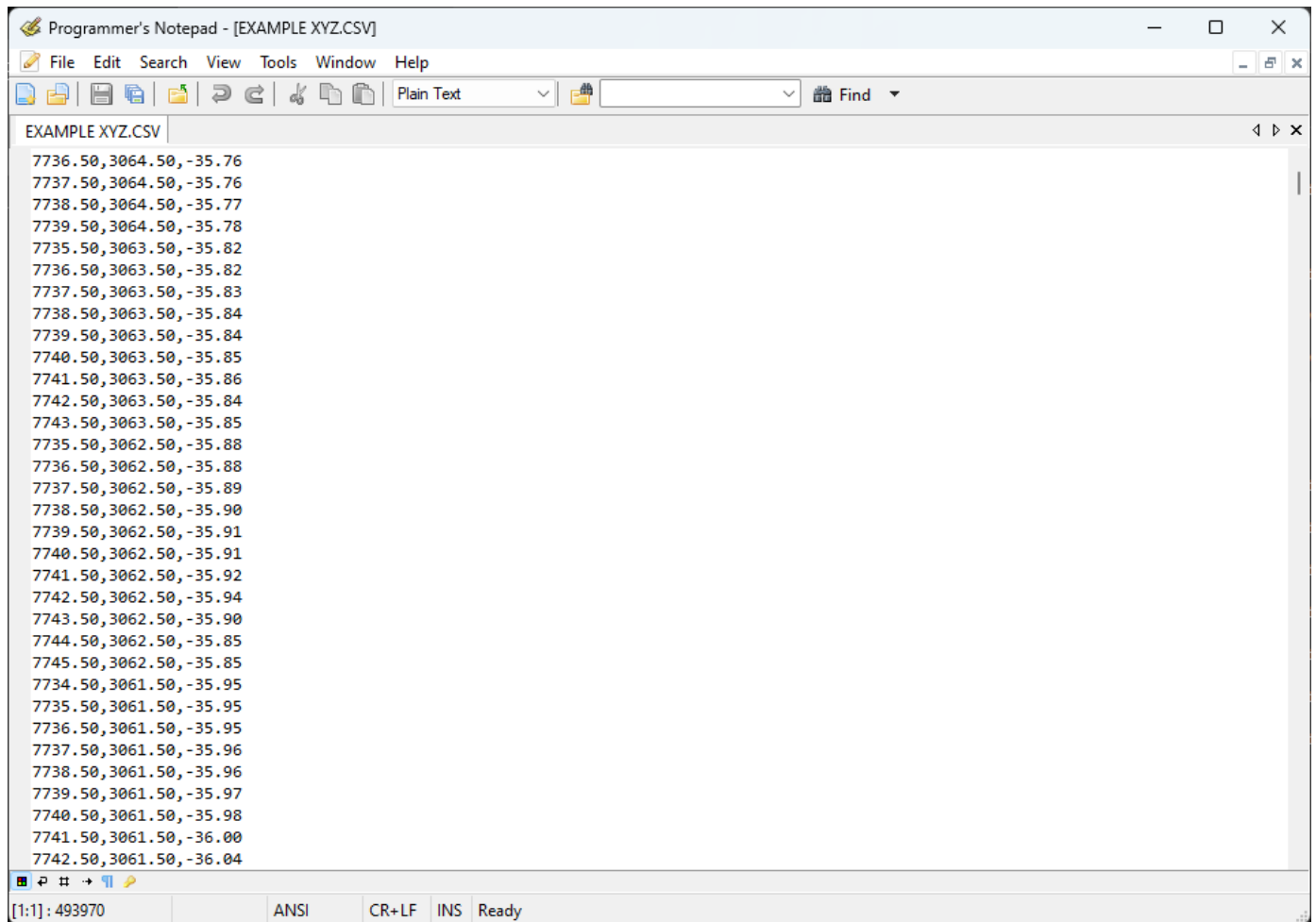
If you zoom into parts of the model you will see where LSS has taken points out. They will be flat / planar areas. It will leave points in where there are sharp changes of slope.



With very modest vertical tolerances you will be surprised how many points can be removed.

The resultant terrain model is smaller, the file sizes smaller and the efficiency of LSS is maintained. This type of intelligent data handling is just one of the main advantages of LSS over other so-called modelling systems.

Thinning normal XYZ data



Programmer's Notepad - [EXAMPLE XYZ.CSV]

```
EXAMPLE XYZ.CSV
7736.50,3064.50,-35.76
7737.50,3064.50,-35.76
7738.50,3064.50,-35.77
7739.50,3064.50,-35.78
7735.50,3063.50,-35.82
7736.50,3063.50,-35.82
7737.50,3063.50,-35.83
7738.50,3063.50,-35.84
7739.50,3063.50,-35.84
7740.50,3063.50,-35.85
7741.50,3063.50,-35.86
7742.50,3063.50,-35.84
7743.50,3063.50,-35.85
7735.50,3062.50,-35.88
7736.50,3062.50,-35.88
7737.50,3062.50,-35.89
7738.50,3062.50,-35.90
7739.50,3062.50,-35.91
7740.50,3062.50,-35.91
7741.50,3062.50,-35.92
7742.50,3062.50,-35.94
7743.50,3062.50,-35.90
7744.50,3062.50,-35.85
7745.50,3062.50,-35.85
7734.50,3061.50,-35.95
7735.50,3061.50,-35.95
7736.50,3061.50,-35.95
7737.50,3061.50,-35.96
7738.50,3061.50,-35.96
7739.50,3061.50,-35.97
7740.50,3061.50,-35.98
7741.50,3061.50,-36.00
7742.50,3061.50,-36.04
```

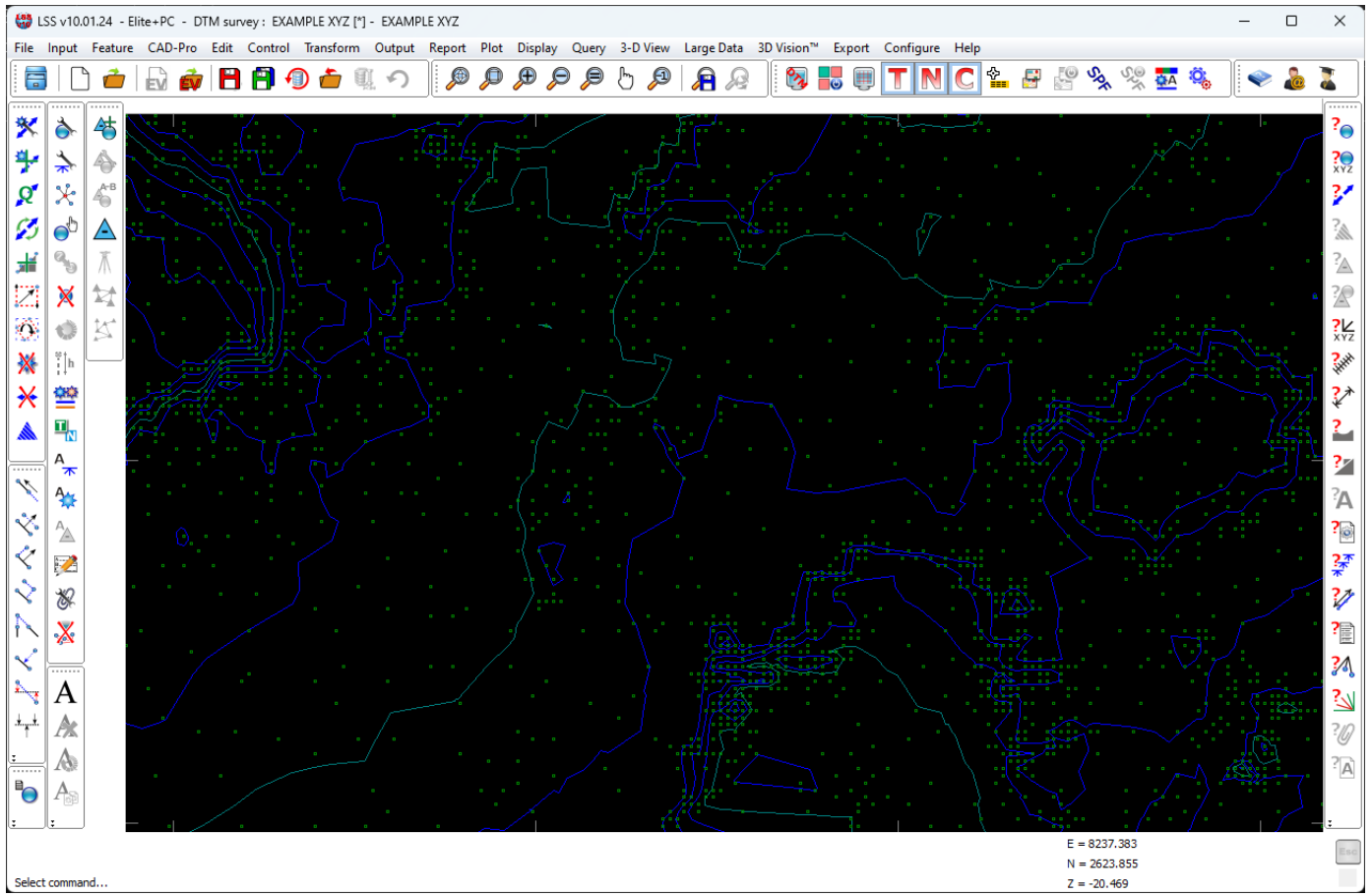
[1:1]: 493970 ANSI CR+LF INS Ready

The good news is that if the data you have received is already in the format X Y Z with either spaces, a comma or tabs between the field then you don't have to convert the data into an LSS load file before running it through the data thinning option.

Once renamed, open the survey into which it will be loaded and choose 'Input / Load Thin Data'.

We go through the same process as with ESRI Ascii data.....





If you need further Technical Support, or you wish to attend any training courses please contact us...

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